User Guide

Fiber Optic Products

PowerCage™ 1600 Enclosure

Modular Power Enclosure for Fiber Optic and Twisted Pair Extenders

Extron® Electronics
INTERFACING, SWITCHING AND CONTROL

68-1717-01 **Rev. C**
02 12

Safety Instructions • English

This symbol is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.

This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

Caution

Read Instructions • Read and understand all safety and operating instructions before using the equipment.

Retain Instructions • The safety instructions should be kept for future reference.

Follow Warnings • Follow all warnings and instructions marked on the equipment or in the user information.

Avoid Attachments • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

Warning

Power sources • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.

Power disconnection • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).

Power cord protection • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.

Servicing • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.

Slots and openings • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.

Lithium battery • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Consignes de Sécurité • Français

Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).

Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.

Attention

Lire les instructions• Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.

Conserver les instructions• Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.

Respecter les avertissements • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.

Eviter les pièces de fixation • Ne pas utiliser de pièces de fixation ni d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

Avertissement

Alimentations • Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité : n'essayez pas de la contourner ni de la désactiver.

Déconnexion de l'alimentation• Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.

Protection du cordon d'alimentation • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.

Réparation-maintenance • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à ces opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.

Fentes et orifices • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.

Lithium Batterie • Il a danger d'explosion s'll y a remplacment incorrect de la batterie. Remplacer uniquement avec une batterie du meme type ou d'un ype equivalent recommande par le constructeur. Mettre au reut les batteries usagees conformement aux instructions du fabricant.

Sicherheitsanleitungen • Deutsch

Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.

Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.

Achtung

Lesen der Anleitungen • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits-und Bedienungsanleitungen genau durchlesen und verstehen.

Aufbewahren der Anleitungen • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.

Befolgen der Warnhinweise • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.

Keine Zusatzgeräte • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

Vorsicht

Stromquellen • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden. Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdanschluß, und stellt eine Sicherheitsfunktion dar. Diese sollte nicht umgangen oder außer Betrieb gesetzt werden.

Stromunterbrechung • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stomversorgung (falls dies möglich ist) oder aus der Wandsteckdose ziehen.

Schutz des Netzkabels • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegengestellt werden können.

Wartung • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden. Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.

Schlitze und Öffnungen • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.

Litium-Batterie • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterietyp, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

Instrucciones de seguridad • Español

Este símbolo se utiliza para advertir al usuario sobre instrucciones importantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.

Este símbolo se utiliza para advertir al usuario sobre la presencia de elementos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.

Precaucion

Leer las instrucciones • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.

Conservar las instrucciones • Conservar las instrucciones de seguridad para futura consulta.

Obedecer las advertencias • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

Evitar el uso de accesorios • No usar herramientas o accesorios que no sean especificamente recomendados por el fabricante, ya que podrian implicar riesgos.

Advertencia

Alimentación eléctrica • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puentearia ni eliminaria.

Desconexión de alimentación eléctrica • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.

Protección del cables de alimentación • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.

Reparaciones/mantenimiento • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligrosos u otros riesgos.

Ranuras y aberturas • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalientamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.

Batería de litio • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.

安全须知 • 中文

这个符号提示用户该设备用户手册中有重要的操作和维护说明。

这个符号警告用户该设备机壳内有暴露的危险电压，有触电危险。

注意

阅读说明书 • 用户使用该设备前必须阅读并理解所有安全和使用说明。

保存说明书 • 用 户应保存安全说明书以备将来使用。

遵守警告 • 用户应遵守产品和用户指南上的所有安全和操作说明。

避免追加 • 不要使用该产品厂商没有推荐的工具或追加设备，以避免危险。

警告

电源 • 该设备只能使用产品上标明的电源。 设备必须使用有地线的供电系统供电。 第三条线（地线）是安全设施，不能不用或跳过 。

拔掉电源 • 为安全地从设备拔掉电源，请拔掉所有设备后或桌面电源的电源线，或任何接到市电系统的电源线。

电源线保护 • 妥善布线， 避免被踩踏，或重物挤压。

维护 • 所有维修必须由认证的维修人员进行。 设备内部没有用户可以更换的零件。为避免出现触电危险不要自己试图打开设备盖子维修该设备。

通风孔 • 有些设备机壳上有通风槽或孔，它们是用来防止机内敏感元件过热。 不要用任何东西挡住通风孔。

锂电池 • 不正确的更换电池会有爆炸的危险。必须使用与厂家推荐的相同或相近型号的电池。按照生产厂的建议处理废弃电池。

FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

The Class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

NOTE: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance with FCC emissions limits.

For more information on safety guidelines, regulatory compliances, EMI/EMF compliance, accessibility, and related topics, **click here**.

Conventions Used in this Guide

In this user guide, the following are used:

CAUTION: A caution indicates a potential hazard to equipment or data.

NOTE: A note draws attention to important information.

TIP: A tip provides a suggestion to make working with the application easier.

WARNING: A warning warns of things or actions that might cause injury, death, or other severe consequences.

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Introduction

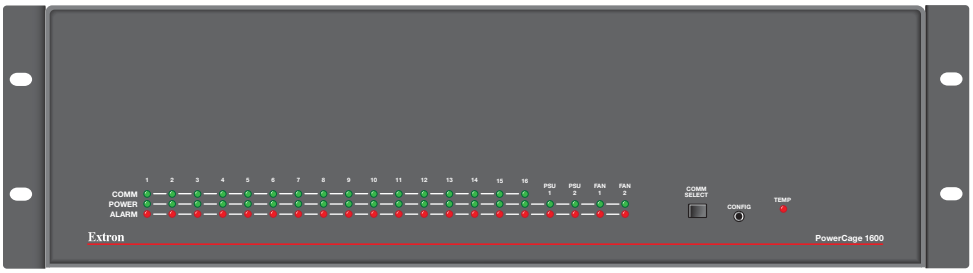
This guide describes the Extron PowerCage 1600 Modular Power Enclosure and how to install, configure, and operate the enclosure and its optional transmitter and receiver boards. Throughout this guide "PowerCage" and "the enclosure" refer to the PowerCage 1600 Enclosure.

This section of the guide covers the following topics:

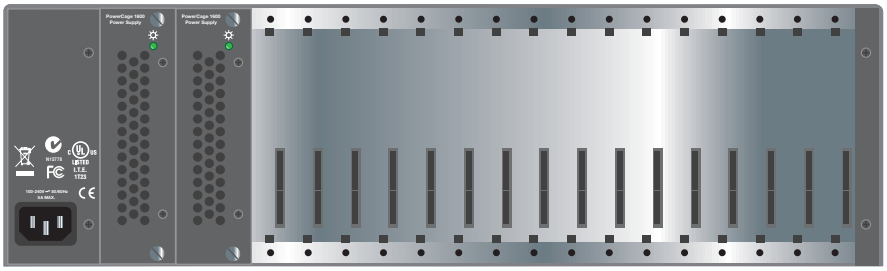
- Overview
- Features
- System Example

Overview

The PowerCage 1600 is a rack-mountable, 16-slot enclosure with vents, fans, and an integrated power supply (or redundant power supplies) that supports a wide range of Extron fiber optic and twisted pair AV transmitter and receiver boards. It provides an efficient way to power and mount multiple transmitters and receivers.



Front Panel (shown with rack ears installed)



Rear Panel (shown populated with optional redundant power supply)

Figure 1. Enclosure Front and Rear Panel Views

A PowerCage system can include any combination of PowerCage fiber optic (FOX) boards and PowerCage twisted pair (MTP) boards mounted within the PowerCage enclosure. Each optional board operates independently of the others. This is an integrated system of individual transmitters and receivers, not a matrixed system.

Features

PowerCage Enclosure and System

- **Versatile input-output options** — The PowerCage 1600 accommodates up to 16 single-slot or 8 double-slot FOX fiber optic boards and MTP twisted pair boards.
- **3U, rack-mountable enclosure** — The enclosure streamlines installation and eliminates individual power supplies for each transmitter and receiver.

- **Modular, field-upgradeable, and hot-swappable design** — The transmitter and receiver boards, and primary and redundant power supplies, are hot-swappable, allowing components to be added or replaced at any time without powering down the system. This is useful for mission-critical applications that require continuous operation.
- **Efficient power management** — Each PowerCage board can power down internal components when no active signal is present, providing increased system efficiency.
- **Optional redundant power supply** — For continuous, mission-critical applications where power reliability is crucial, add a redundant power supply, part number 70-784-01.
- **Thermal management** — The PowerCage enclosure provides channeled air flow to each board for optimal cooling and reliable operation.

PowerCage FOX Fiber Optic Extender Boards

The fiber optic transmitter and receiver boards:

- Are available in singlemode or multimode versions.
- Support standard definition or high resolution video, HDMI, stereo audio, and RS-232 over a single fiber. They extend high resolution RGB, DVI-D, multi-rate SDI, standard resolution component, S-video, or composite video extreme distances.

  NOTE: Two fibers are needed when transmitting an HDCP signal.

- Deliver pixel-for-pixel image quality for high resolution video. All digital, zero compression transmission ensures image quality over long distances at high resolutions.
- Provide alarm notification for fiber link loss and can be set up to trigger an external control system for immediate notification when a fiber link has been lost.
- PowerCage FOX DVI, DVI Plus, and VGA Fiber Optic Extenders are compatible with and can be mixed and matched with FOXBOX and FOX 500 Series transmitters and receivers for versatile system designs and configurations, including ultra-long distance DVI-to-analog RGB and RGB-to-DVI conversion.
- Include the following models:
  - **PowerCage FOX VGA** — Fiber Optic Extender for VGA, Audio, and RS-232
  - **PowerCage FOX DVI, PowerCage FOX DVI Plus** — Fiber Optic Extender for DVI, Audio, and RS-232
  - **PowerCage FOX 3G HD-SDI** — Fiber Optic Extender for Multi-Rate SDI
  - **PowerCage FOX AV** — Fiber Optic Extender for Video, Audio, and RS-232
  - **PowerCage FOX HDMI** — Fiber Optic Extender for HDMI, Audio, and RS-232

PowerCage MTP Twisted Pair Boards

The twisted pair transmitter and receiver boards:

- Support standard definition or high resolution video, and audio or RS-232 over a single CAT 5/5e/6 (shielded or unshielded) cable. They transmit and receive high resolution RGBHV, RGBS, RGsB, RsGsBs, component video, S-video, and composite video long distances.
- Include the following models:
  - **PowerCage MTP T 15HD RSA** — MTP Twisted Pair Transmitter for VGA and Audio or RS-232
  - **PowerCage MTP R 15HD RSA SEQ** — MTP Twisted Pair Receiver for VGA and Audio or RS-232 with Skew Equalization
  - **PowerCage MTP T AV** — MTP Twisted Pair Transmitter for Composite or S-video and Audio
  - **PowerCage MTP R AV** — MTP Twisted Pair Receiver for Composite or S-video and Audio

System Example

The following diagram shows a typical PowerCage 1600 system installation.

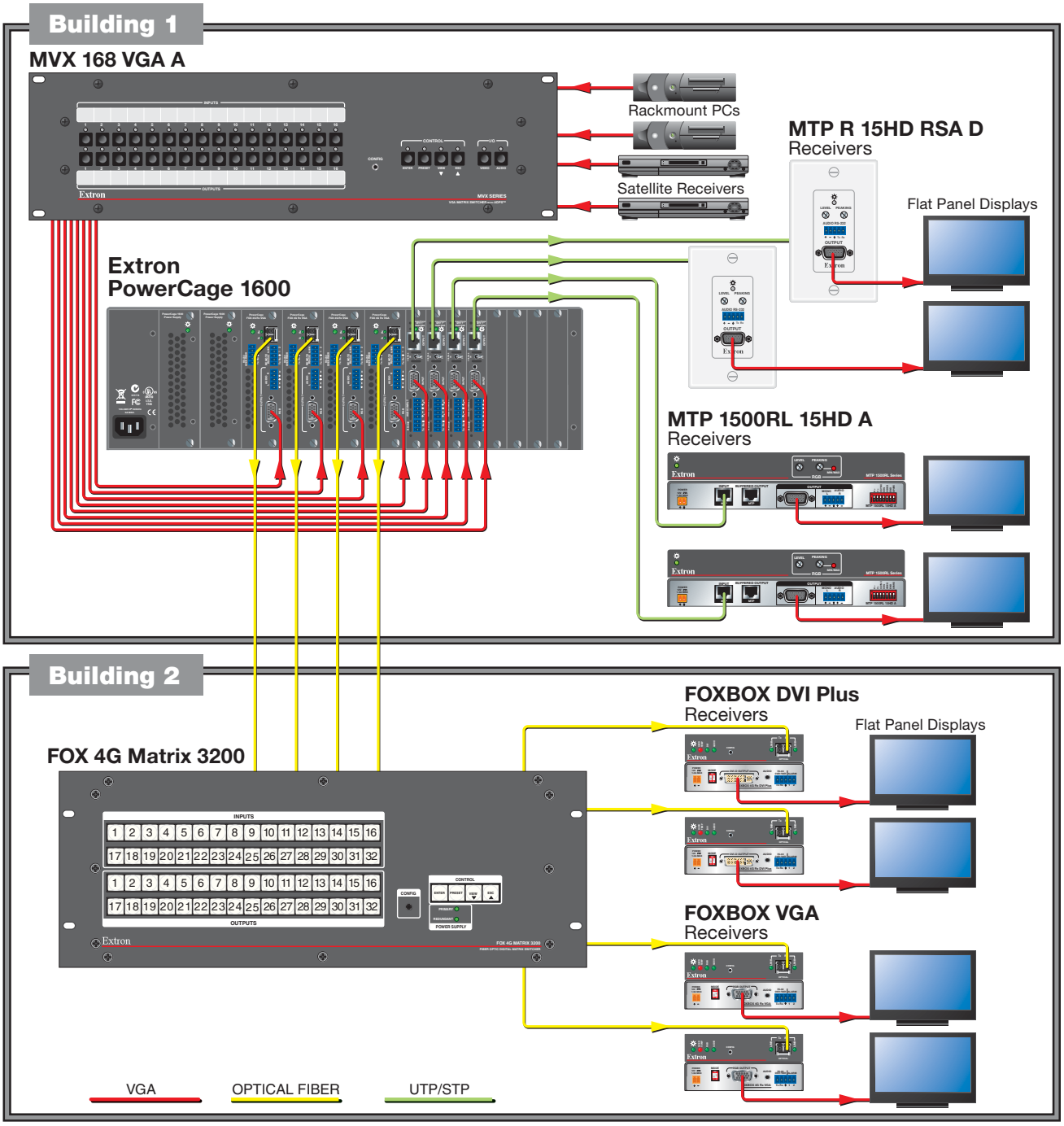


Figure 2. An Example PowerCage 1600 System Installation

Installation

Topics covered in this section of the guide include the following:

- **Enclosure and Rear Panel Features**
- **Installing the Transmitter and Receiver Board into the Enclosure**
- **Mounting the Unit**
- **Cabling and Testing**

The boards and power supplies are hot-swappable and can be installed or replaced at any time. However, the most convenient way to proceed with initial installation is as follows:

1. Install the optional redundant power supply and transmitter and receiver boards in the enclosure.

   NOTES:
   - Cover all empty board slots; do not leave them open. Securely fasten the screws for boards and blank panels.
   - Use a tool to fully tighten the screws after initial installation and subsequent removal and replacement of the boards.

2. Mount the enclosure to an equipment rack.
3. Connect cables to the transmitter and receiver boards and to input and output devices.
4. Connect the power cable to the unit and test the system.

Heed the following safety information when installing or servicing the PowerCage system:

CAUTION: The PowerCage uses double pole/neutral fusing.
Power must be disconnected before servicing internal components.
Do not leave empty board slots open or uncovered while the unit is powered on.

Enclosure and Rear Panel Features

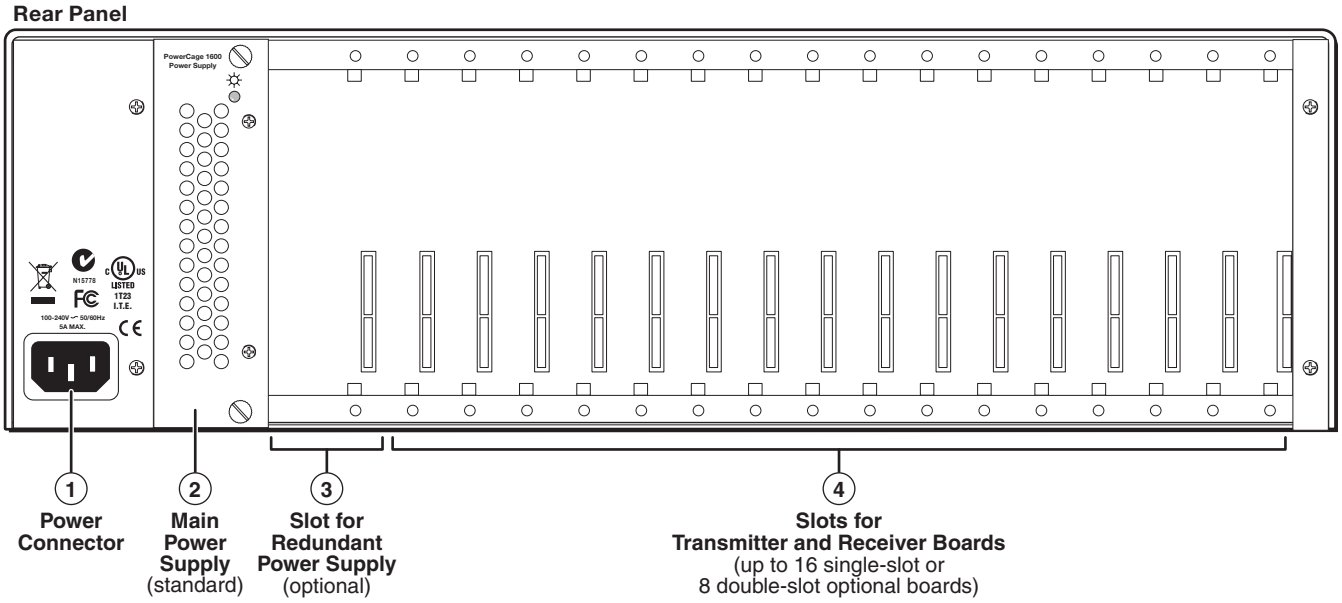


Figure 3. The Rear Panel of the PowerCage 1600 Enclosure

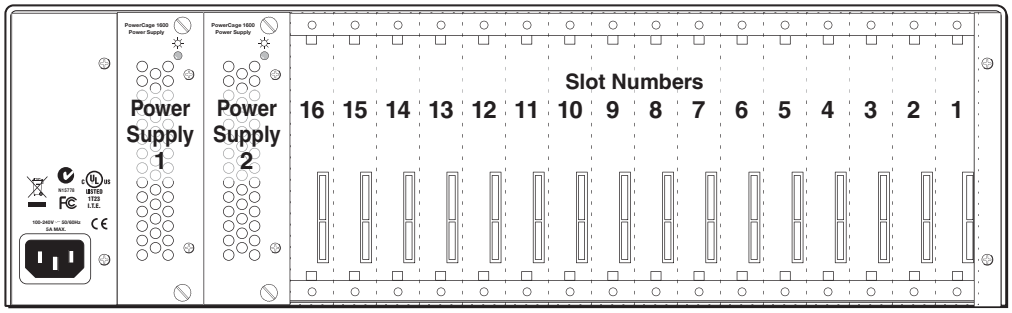
① **Power connector** — Connect this port to a 110-240 VAC, 50-60 Hz power source using a standard IEC power cord.

> **NOTE:** The power supplies and transmitter and receiver boards may be installed or replaced before or after the unit is powered on.

② **Main power supply** — This power supply is included with every PowerCage enclosure. The front panel **PSU 1 LEDs** indicate the status of this power supply.

③ **Slot for a redundant power supply** — An optional redundant power supply can be installed in this slot. If this second power supply is installed, the front panel **PSU 2 LEDs** indicate its status.

④ **Slots for transmitter and receiver boards** — Slots are numbered from 16 to 1 from left to right as viewed from the rear of the unit and shown in the following diagram:



The front panel **board status LED** numbers correspond to these slot numbers.

> **NOTES:**
> - Cover all empty board slots; do not leave them open. Securely fasten the screws for boards and blank panels.
> - A double-slot board connects to the lower-numbered slot.

Installing Transmitter and Receiver Boards into the Enclosure

Any combination of up to 16 single-slot or 8 double-slot transmitter or receiver boards can be installed in the PowerCage enclosure. The quantity and type of boards varies depending on the configuration for each installation site.

Before installing the boards in the enclosure, refer to the model-specific guide for each PowerCage transmitter and receiver board you are installing. Some boards have switches that must be set before installation. The guides describe the features of each board and how to set up and cable it.

NOTE: The boards are hot-swappable; they can be installed or removed without turning off or disconnecting the power to the PowerCage enclosure.

CAUTIONS:
- Use ESD precautions when installing a board to avoid damaging it. Keep the board in the anti-static bag until it is needed.
- Use proper grounding techniques during installation.

1. Where applicable, remove as many blank plates or previously installed boards from the rear of the PowerCage Enclosure as necessary to accommodate the number of new boards to be installed. Save the screws for use in step **3**.
2. Hold the board with the signal connectors towards you and the LED at the top, and align the top and bottom grooves of the board with the slide posts in the selected enclosure slot, as shown in the following figure:

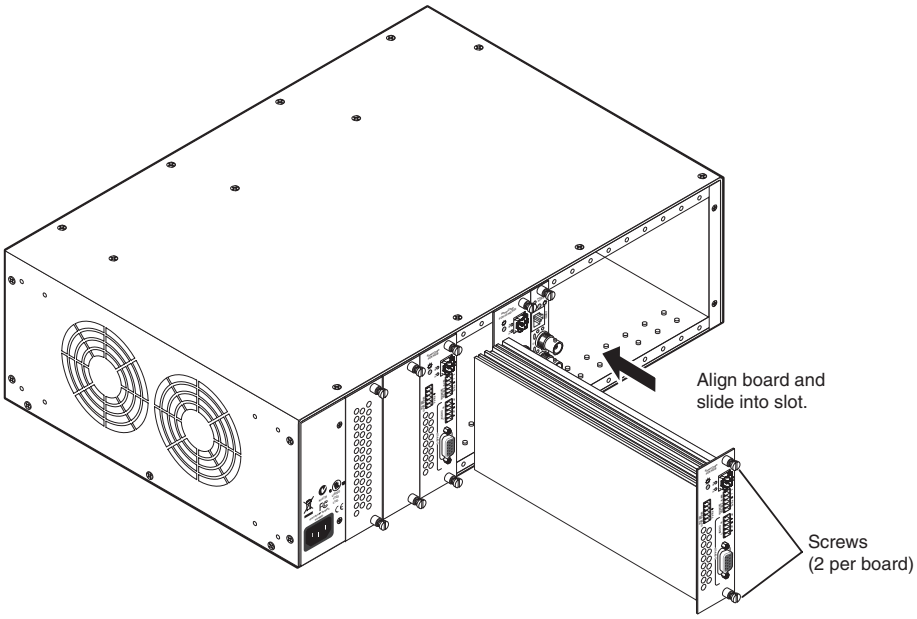


Figure 4. Inserting Boards into the PowerCage Enclosure

3. Carefully slide the board into the slot, aligning the two tabs on the lower front end of the board with the matching ports in the enclosure. Push the board firmly into place. Tighten the screws to secure the board in place.

   NOTE: Use a tool to fully tighten the screws after initial installation and subsequent removal and replacement of the boards.

4. Repeat steps **2** and **3** for all boards needing installation.

Mounting the Unit

The PowerCage enclosure can be mounted in a standard equipment rack before or after installing transmitter and receiver boards. To rack mount the enclosure, follow the UL guidelines and refer to the diagram in the "**Rack Mounting**" section.

UL Guidelines for Rack Mounting

The following Underwriters Laboratories (UL) guidelines pertain to the safe installation of the equipment in a rack.

1. **Elevated operating ambient —** If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consider installing the equipment in an environment compatible with the maximum ambient temperature specified by the manufacturer [Tma = +32 to +122 °F (0 to +50 °C)].
2. **Reduced air flow —** Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
3. **Mechanical loading —** Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
4. **Circuit overloading —** Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
5. **Reliable earthing (grounding) —** Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (such as the use of power strips).

Rack Mounting

CAUTION: Leave open space of at least 1U on the top, bottom, and sides of the enclosure to allow adequate air circulation and prevent overheating. Do not cover the vents or fans.

NOTE: Air flows through the enclosure from right to left, as viewed from the front panel.

To rack mount the enclosure:

1. Attach the mounting brackets to the sides of the enclosure, as shown in figure 5. The brackets can be attached at either the front or the back.
2. Fasten the brackets to the rack.

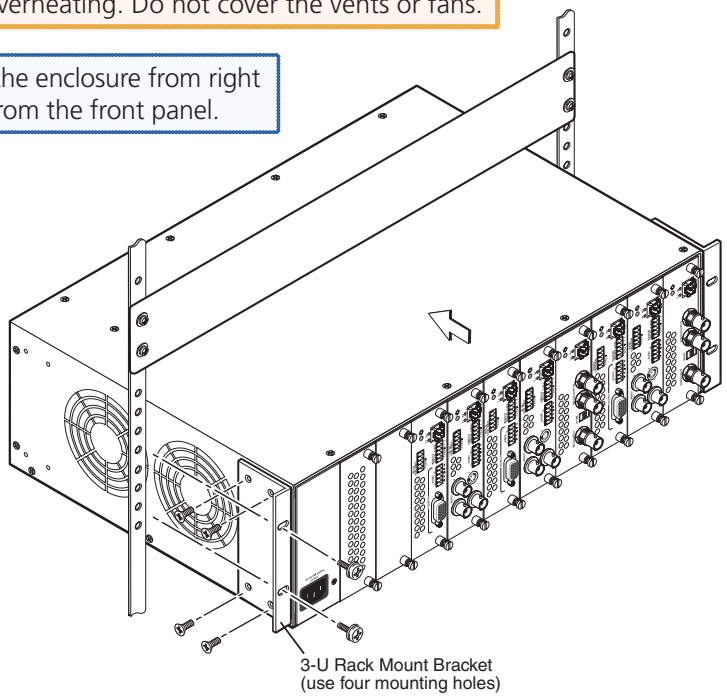


Figure 5. Attaching Brackets and Rack Mounting the Enclosure

Cabling and Testing

Refer to the setup guides and user guides for the models of transmitter and receiver boards you are installing for details on how to cable and set up each board.

- Some fiber optic boards include pass-through RS-232 connections.
- Some boards have mode switches.
- Some MTP twisted pair boards include picture adjustment or peaking controls.

Operation

The following topics are covered in this section of the guide:

- Front Panel Features
- Communicating with the Boards: Making an RS-232 Connection

Front Panel Features

The front panel of the PowerCage 1600 Enclosure provides a variety of light emitting diode (LED) status indicators, a selection button, and a port for communicating with an active installed board. See the diagram below and the following descriptions for details.

Front Panel

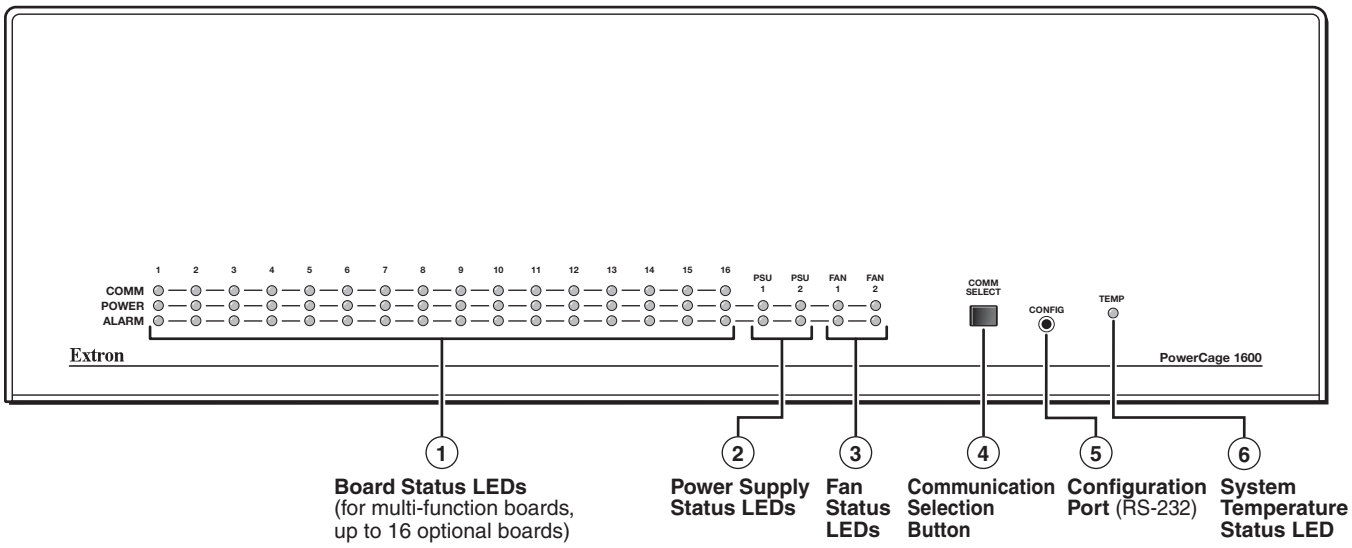
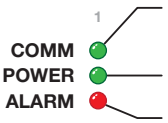


Figure 6. The PowerCage 1600 Enclosure Front Panel

① **Board status LEDs (Comm, Power, Alarm)** — There is one set of these LEDs for each of the 16 rear panel slots that is available for boards. If a board is installed in the identically-numbered slot, the LEDs light under the following circumstances:



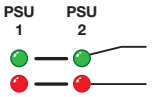
Comm LED — Lights when the corresponding board is selected (see ④, Comm Select button) and, for FOX boards, can be communicated with via the Config port (⑤).

Power LED — Lights when the corresponding board receives power.

Alarm LED — Lights when the receiving (Rx) fiber link on a PowerCage FOX board is broken or disconnected. This feature depends on the model of PowerCage board. This LED is not used for PowerCage MTP boards.

NOTE: For a double-slot board, the status LEDs light only for the lower-numbered slot.

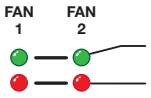
② **Power supply (PSU) status LEDs** — These pairs of LEDs correspond to the primary (included) power supply and the redundant (optional) power supply. For each power supply, the LEDs light as follows:



Power LED — Lights when the power supply receives power.

Alarm LED — Lights when the power supply malfunctions, such as providing an overvoltage (14 VDC or more) or undervoltage (10.5 VDC or less).

③ **Fan status LEDs** — These LEDs indicate whether the fans that cool the enclosure are operating.



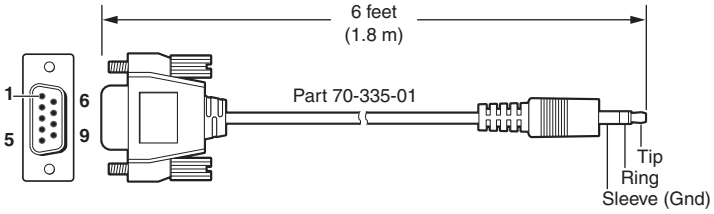
Power LED — Lights when the corresponding fan receives power.

Alarm LED — Lights when the corresponding fan malfunctions.

④ **Communication selection (Comm Select) button** — Press this button to select the desired board to connect to the Config port (⑤). With each button press, the serial connection changes from one active, installed board to the next. The Comm LED (see ①) for the selected board lights.

NOTES:
- When unit power is cycled (removed then restored), the serial connection returns to the board in the lowest-numbered slot.
- The Comm LED lights for each installed, powered board as its slot is selected, regardless of the type of board. However, RS-232 communication works only with FOX boards; commands and queries cannot be sent to or passed through the MTP boards.

⑤ **Configuration and communication (Config) port** — For RS-232 serial communication with any installed board, connect a Windows®-based PC or an RS-232 control system to this 2.5 mm mini stereo-style (tip-ring-sleeve) jack. Use the Extron 9-pin D to 2.5 mm st ereo mini TRS RS-232 cable (part number 70-335-01, shown in the following figure) or make your own cable.



9-pin D	Connection	TRS Plug
Pin 2	Computer's Rx line	Tip
Pin 3	Computer's Tx line	Ring
Pin 5	Computer's signal ground	Sleeve

Figure 7. 9-pin D to 2.5 mm Stereo Mini TRS RS-232 Cable

RS-232 protocol varies depending on the board being communicated with (see the **specifications** section), but all boards accept this basic set of protocol:

- 9600 baud
- 1 stop bit
- 8 data bits
- no parity
- no flow control

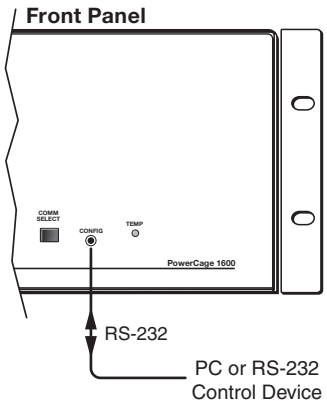
NOTE: This port allows serial communication to the boards only, not to the enclosure, itself. The power supply and fan status LEDs provide feedback about the condition of the enclosure.

⑥ **Temperature status (Temp) LED** — This LED lights when the unit as a whole is operating at a dangerously high temperature (approximately 167 °F [75°C]) and equipment damage is imminent. If the Temp LED lights, power down the unit, ensure adequate ventilation, and allow the PowerCage system to cool before restoring power.

Communicating with the Boards: Making an RS-232 Connection

RS-232 communication works only with FOX boards; commands and queries cannot be sent to or passed through the MTP boards. To communicate with and check some basic information about individual installed transmitter or receiver boards, do the following:

1. Connect the serial port of a Windows-based PC or an RS-232 control device to the front panel Config port on the PowerCage system, and power on both devices.



2. Set the serial connection as follows:
   - 9600 baud
   - 1 stop bit
   - 8 data bits
   - no parity
   - no flow control

3. Press the Comm Select button to select the desired board to connect to the Config port. The Comm LED for the selected board lights. With each button press, the serial connection changes from one installed board to the board installed in the next higher-numbered slot,as shown in the following figure. (The next slot may not be numbered contiguously with the previously selected board.)

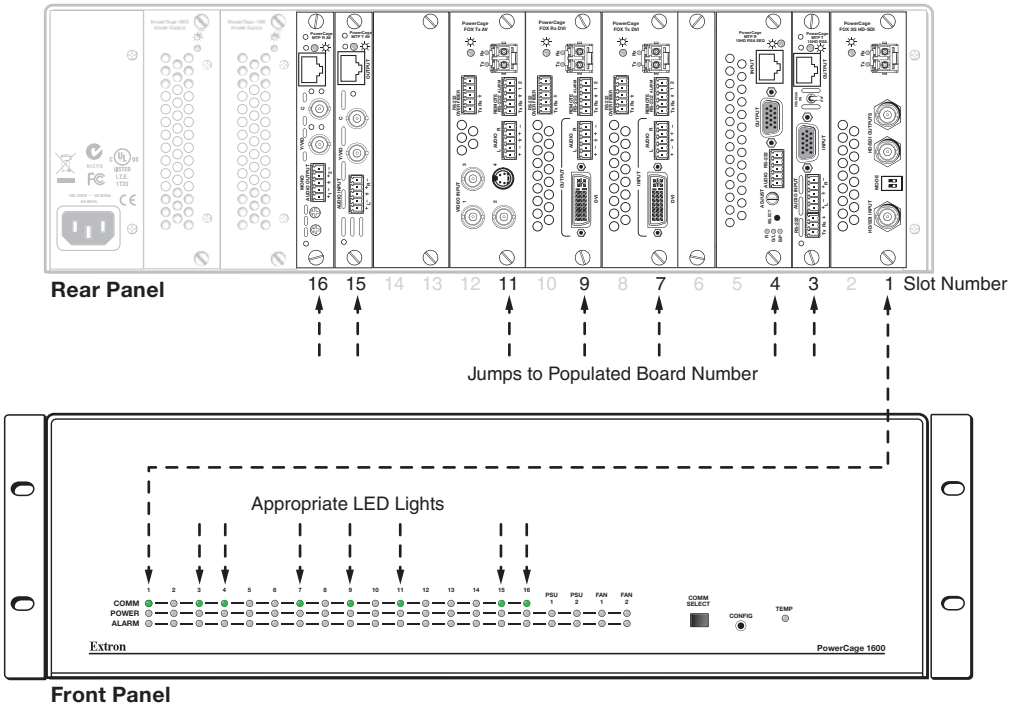


Figure 8. Changing Serial Connections From One Board to the Next

NOTES:
- The Comm LED lights for each installed, powered board as its slot is selected, regardless of the type of board. For a double-slot board, only the LED for the lower-numbered slot lights.
- The serial connection remains with the last-selected board while the unit is on. When unit power is cycled (removed then restored), the serial connection returns to the board in the lowest-numbered slot.

4. Use a terminal emulation program such as Telnet or Extron DataViewer to send Simple Instruction Set (SIS) commands and queries to the selected board. For model-specific commands and adjustments, refer to the user guide for each model of board that is installed in the PowerCage Enclosure.

Specifications and Part Numbers

This section of the guide includes the following material:

- **Specifications**
- **Part Numbers (for included parts and accessories)**

Specifications

NOTE: The PowerCage FOX boards are available in singlemode or multimode versions.

NOTE: The optional PowerCage FOX boards are class 1 laser products. They meet the safety regulations of IEC-60825, FDA 21 CFR 1040.10, and FDA 21 CFR 1040.11.

Optical specifications — PowerCage FOX boards, interconnection between transmitter and receiver

Number/type ..... 1 singlemode or 1 multimode fiber optic input and output per FOX board, up to 8 double space boards per PowerCage enclosure

NOTE: Only one fiber is required to transmit video, audio, and unidirectional data. A second fiber is required to transmit return data for bidirectional control/communication.

Connectors ..... 2 bidirectional LC connectors per FOX board

Operating distance

- Singlemode ..... 30 km (18.75 miles) with singlemode (SM) cables with a SM board
- Multimode..... 300 m (985') with 62.5 µm OM1 multimode (MM) cable and a MM board
  1 km (3280') with 50 µm OM2 multimode (MM) cable and a MM board
  2 km (6561') with 50 µm OM3/OM4 2000 MHz bandwidth laser optimized MM cable and a MM board

NOTE: Operating distance is approximate. These are typical distances. The maximum distance may be greater than these typical numbers depending on factors such as fiber type, fiber bandwidth, connector splicing, losses, modal or chromatic dispersion, environmental factors, and kinks.

Nominal peak wavelength ..... 850 nm for multimode (MM), 1310 nm for singlemode (SM)

Transmission power, singlemode or multimode
-5 dBm, typical

Maximum receiver sensitivity

- Singlemode ..... -18 dBm, typical
- Multimode..... -12 dBm, typical

Optical loss budget

- Singlemode ..... 13 dB, maximum
- Multimode..... 7 dB, maximum

Maximum channel data rate

- PowerCage FOX AV boards..... 2.125 Gbps
- PowerCage FOX HDMI boards . 4.95 Gbps (1.65 Gbps per color)
- Other PowerCage FOX boards . 4.25 Gbps

Video — PowerCage FOX Tx/Rx VGA

NOTE: For PowerCage FOX VGA boards, the analog video input signal is digitized pixel for pixel in the transmitter, sent digitally through the fiber cable, and converted back to analog video in the receiver.

Signal type	VGA-UXGA RGBHV, RGBS, RGsB, RsGsBs
Gain	Unity
Pixel data bit depth	8 bits per channel, 3 channels (R, G, B)
Maximum resolution	1600x1200 or 1080p @ 60 Hz, digitized pixel for pixel; higher resolutions up to 2048x1120, undersampled

Video input — PowerCage FOX Tx VGA

Number/signal type	1 VGA-UXGA RGBHV, RGBS, RGsB, RsGsBs
Connector	1 female 15-pin HD
Nominal levels	0.7 Vp-p for RGB
Minimum/maximum levels	Analog: 0.3 V to 0.75 Vp-p with no offset, terminated
Impedance	75 ohms
Horizontal frequency	24 kHz to 100 kHz
Vertical frequency	40 Hz to 120 Hz
Return loss	<-40 dB @ 5 MHz

Video output — PowerCage FOX Rx VGA

Number/signal type	With input from a FOXBOX Tx VGA or a FOX 500 Tx: 1 VGA-UXGA RGBHV, RGsB (follows input or can be set by user) With input from a FOXBOX Tx VGA/YUV: 1 VGA-UXGA RGBHV, component video (bi- or tri-level YUV, 480p, 576p, 720p, 1080i, 1080p)
Connector	1 female 15-pin HD
Nominal levels	1 Vp-p for Y of component video 0.7 Vp-p for RGB and for R-Y and B-Y of component video
Minimum/maximum levels	0.3 V to 0.75 Vp-p, terminated
Impedance	75 ohms
Return loss	-30 dB @ 5 MHz
DC offset	±5 mV with input at 0 offset
Video delay	1-2 frames

Sync — PowerCage FOX Tx/Rx VGA

Input type	RGBHV, RGBS, RGsB, RsGsBs
Output type	RGBHV, RGsB (follows input or can be set by user)
Input level	2.5 V to 5.0 Vp-p
Output level	TTL: 5.0 Vp-p, unterminated, on HV, for RGBHV, RGBS 0.3 Vp-p for component video (bi-level sync) or for Gs (SOG) 0.6 Vp-p for component video (tri-level sync)
Input impedance	10k ohms
Output impedance	75 ohms
Polarity	Positive or negative (follows input or can be set by user)

Video — PowerCage FOX Tx DVI, PowerCage FOX Tx/Rx DVI Plus

Resolution range	
PowerCage FOX Tx DVI	Up to 1600x1200 or 1080p @ 60 Hz pixel for pixel; higher resolutions up to 1920x1200 @ 60 Hz, undersampled
PowerCage FOX Tx/Rx DVI Plus	Up to 1920x1200 or 1080p @ 60 Hz pixel for pixel
Formats	RGB and YCbCr digital video
Standards	DVI 1.0, HDMI

Video input — PowerCage FOX Tx DVI, PowerCage FOX Tx DVI Plus

Number/signal type	1 single link DVI-D (or HDMI*)
Connector	1 female DVI-I

NOTE: *Appropriate DVI-D to HDMI cables or adapters are required for HDMI signal input/output. The PowerCage FOX DVI and DVI Plus boards can be used to distribute HDMI signals if you use a DVI-to-HDMI adapter. However, when using HDMI signals, these units do not transmit audio and CEC signals.
These boards do not support transmission of DVI signals with High-bandwidth Digital Content Protection (HDCP).

Video output — PowerCage FOX Rx DVI Plus

Number/signal type	1 single link DVI-D (or HDMI*)
Connector	1 female DVI-I
Nominal level	0.8 Vp-p
Video delay	1-2 frames

Video — PowerCage FOX 3G HD-SDI

NOTE: The PowerCage FOX 3G HD-SDI is a transceiver that can function as a transmitter or as a receiver. Two units are required for a transmitter-receiver system with one fiber optic cable linking the two units.

Signal type	HD-SDI, SDI, and 3G-SDI digital video signals
Gain	Unity
Resolution	8 or 10 bits, automatic
Data rates	270 Mbps, 1.485 Gbps, 2.970 Gbps
Operation standards	SMPTE 259M-C, SMPTE 292M, SMPTE 424M, ITU-R BT.601, ITU-R BT.1120
Auto data rate lock	Yes

Video input — PowerCage FOX 3G HD-SDI transmitter

Number/signal type	1 single link SDI, HD-SDI, or 3G-SDI digital component video
Connectors	1 female BNC
Data rates	19 Mbps to 2.97 Gbps
Nominal level	0.8 Vp-p
Minimum/maximum levels	0.5 V to 1 Vp-p with no offset
Impedance	75 ohms
Return loss	≥15 dB @ 5 MHz to 1.5 GHz ≥10 dB @ 1.5 GHz to 3 GHz
DC offset (max. allowable)	5 V
Input coupling	AC
Input cable equalization	Automatic for up to -30 dB of cable loss
HD-SDI	120 m (400') using Extron RG6 cable 90 m (300') using Extron RG59 cable
SDI	150 m (500') using Extron RG6 cable 120 m (400') using Extron RG59 cable

NOTE: The transmission distance varies depending on the signal resolution and on the type of cable, graphics card, and display used in the system.

Video output — PowerCage FOX 3G HD-SDI receiver

Number/signal type	2 single link SDI, HD-SDI, or 3G-SDI digital component video
Connectors	2 female BNC
Re-clocking	Automatic for 270 Mbps, 1.485 Gbps, 2.97 Gbps, or bypassed for unrecognized rates
Nominal level	0.8 Vp-p
Minimum/maximum levels	0.5 V to 1.0 Vp-p
Impedance	75 ohms
Return loss	<-25 dB @ 100 MHz
DC offset	±5 mV with input at 0 offset

Video — PowerCage FOX Tx/Rx AV

NOTE: For PowerCage FOX AV boards, the analog video input signal is digitized pixel for pixel in the transmitter, sent digitally through the fiber cable, and converted back to analog video in the receiver.

Gain	Unity
Standards	
Input	NTSC 3.58, NTSC 4.43, PAL, SECAM, autodetected
Output	NTSC 3.58, PAL (follows vertical rate)
Decoder type	Adaptive 2D, digital comb filter

Video input — PowerCage FOX Tx AV

Number/signal type	1 component (Y, R-Y, B-Y), S-video, composite video
Connectors	1 x 3 female BNC *or* 1 female 4-pin mini DIN for S-video
Nominal levels	1.0 Vp-p for Y of component video and S-video, and for composite video 0.7 Vp-p for R-Y, B-Y of component video 0.3 Vp-p for C of S-video
Minimum/maximum levels	Analog: 0.3 V to 1.5 Vp-p with no offset
Impedance	75 ohms
Return loss	-30 dB for Y/VID, B-Y/C, R-Y @ 5 MHz
Input coupling	AC

Video output — PowerCage FOX Rx AV

Number/signal type	1 component (Y, R-Y, B-Y) video, S-video, composite video
Connectors	1 x 3 female BNC *or* 1 female 4-pin mini DIN for S-video
Nominal levels	1.0 Vp-p for Y of component video and S-video, and for composite video 0.7 Vp-p for R-Y, B-Y of component video 0.3 Vp-p for C of S-video
Minimum/maximum levels	0.3 V to 1.5 Vp-p
Impedance	75 ohms
Return loss	<-40 dB @ 5 MHz
DC offset	+350 mV, maximum, with input at 0 offset
Video delay	1-2 frames

Video — PowerCage FOX Tx/Rx HDMI

NOTE: Appropriate DMI to DVI-D cables or adapters are required for DVI signal input and output.

Maximum data rate	4.95 Gbps (1.65 Gbps per color)
Maximum pixel clock	165 MHz
Resolution range	Up to 1920x1200 or 1080p @ 60 Hz, 8-bit color
Formats	RGB, YCbCr, xvYCC digital video
Standards	DVI 1.0, HDMI, HDCP 1.1, CEA-861E

Video input — PowerCage FOX Tx HDMI

Number/signal type	1 single link HDMI
Connectors	1 female 19-pin HDMI type A

Video output — PowerCage FOX Rx HDMI

Number/signal type	1 single link HDMI
Connectors	1 female 19-pin HDMI type A

Video — PowerCage MTP T 15HD RSA, PowerCage MTP R 15HD RSA SEQ

Gain	Unity
Number/signal type	1 set of proprietary analog signals
Connector	1 female RJ-45

Video input — PowerCage MTP T 15HD RSA

Number/signal type	1 analog RGBHV, RGBS, RGsB, RsGsBs, component video (YUVi or YUVp/HDTV), S-video, or composite video
Connector	1 female 15-pin HD
Nominal levels	1 Vp-p for Y of component video and S-video, and for composite video 0.7 Vp-p for RGB and for R-Y and B-Y of component video 0.3 Vp-p for C of S-video
Minimum/maximum levels	0.3 V to 1.45 Vp-p
Impedance	75 ohms
Horizontal frequency	15 kHz to 130 kHz
Vertical frequency	30 Hz to 150 Hz
Return loss	<-30 dB @ 5 MHz
DC offset (max. allowable)	250 mV

Video output — PowerCage MTP R 15HD RSA SEQ

Number/signal type	1 analog VGA-UXGA RGBHV, RGBS, RGsB, RsGsBs, component video (YUVi or YUVp/HDTV), S-video, or composite video
Connector	1 female 15-pin HD
Nominal levels	1 Vp-p for Y of component video and S-video, and for composite video 0.7 Vp-p for RGB and for R-Y and B-Y of component video 0.3 Vp-p for C of S-video
Minimum/maximum levels	0.3 V to 1.45 Vp-p
Impedance	75 ohms
Return loss	<-30 dB @ 5 MHz
DC offset	<±35 mV with input at 0 offset
Skew compensation	62 ns
Maximum resolution	Up to 1920x1200 or 2048x1080 or 1080p at 300' Up to 1024x768 at 600'

NOTE: Refer to the user guide for the maximum distances recommended for specific resolutions.

Sync — PowerCage MTP T 15HD RSA, PowerCage MTP R 15HD RSA SEQ

Input/output type	RGBHV, RGBS, RGsB, RsGsBs
Standards	NTSC 3.58, NTSC 4.43, PAL, SECAM
Input level (transmitter)	3.5 V to 5.5 Vp-p, unterminated
Output level (receiver)	4.0 V to 5.0 Vp-p, unterminated
Input impedance (transmitter)	573 ohms ±5%
Output impedance (receiver)	110 ohms
Polarity	
Transmitter	Positive or negative (follows input polarity)
Receiver	Positive or negative (switch-selectable)

Video — PowerCage MTP T AV, PowerCage MTP R AV

Gain	Unity
Differential phase error	<1.0° at 3.58 MHz and 4.43 MHz
Differential gain error	<1.0% at 3.58 MHz and 4.43 MHz

Video input — PowerCage MTP T AV

Number/signal type	1 S-video or composite video
Connectors	2 female BNC
Nominal level	1 Vp-p for Y of S-video and for composite video 0.3 Vp-p for C of S-video
Minimum/maximum levels	0.3 V to 1.5 Vp-p with no offset
Impedance	75 ohms
Return loss	<-30 dB, DC @ 10 MHz
DC offset (max. allowable)	250 mV

Video output — PowerCage MTP R AV

Number/signal type	1 S-video or composite video
Connectors	2 female BNC
Nominal level	1 V p-p for Y of S-video and for composite video 0.3 V p-p for C of S-video
Minimum/maximum level	0.3 V to 1.5 Vp-p
Impedance	75 ohms
Return loss	<-35 dB @ 5 MHz
DC offset	±20 mV with input at 0 offset

Sync — PowerCage MTP T AV, PowerCage MTP R AV

Standards	NTSC 3.58, NTSC 4.43, PAL, SECAM

Audio — PowerCage FOX Tx/Rx VGA, PowerCage FOX Tx DVI, PowerCage FOX Tx/Rx DVI Plus, PowerCage FOX Tx/Rx AV, PowerCage FOX Tx/Rx HDMI

NOTE: In PowerCage FOX boards, the analog audio signal(s) is (are) digitized in the transmitter, sent through the fiber cable, and converted back to analog audio in the receiver.

Gain	
Range	Adjustable, -18 dB to +10 dB
Default	
PowerCage FOX Tx/Rx HDMI	Unbalanced output: 0 dB
All other boards	Unbalanced output: -6 dB; balanced output: 0 dB
Frequency response	20 Hz to 20 kHz, ±0.5 dB
THD + Noise	
VGA, DVI, and HDMI boards	0.10% @ 1 kHz at nominal level
AV boards	0.15% @ 1 kHz at nominal level
S/N	>80 dB at maximum output (unweighted)
CMRR	65 dB @ 20 Hz to 20 kHz
Audio bits per sample	18 bits per channel, 2 channels (L, R)
Sampling rate	48 kHz

Audio input — PowerCage FOX Tx VGA, PowerCage FOX Tx DVI, PowerCage FOX Tx DVI Plus

Number/signal type	1 stereo, balanced/unbalanced *or* 2 mono, balanced/unbalanced
Connector	(1) 3.5 mm captive screw connector, 5 pole
Impedance	18k ohms unbalanced, DC coupled
Nominal level	+4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level	+8.9 dBV, unbalanced at 1% THD+N

NOTE: 0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV ≈ 2 dBu

Audio input — PowerCage FOX Tx AV

Number/signal type	1 stereo, balanced/unbalanced *or* 2 mono, balanced/unbalanced
Connector	(1) 3.5 mm captive screw connector, 5 pole
Impedance	>10k ohms unbalanced, >20k ohms balanced, DC coupled
Nominal levels	+4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level	+17 dBV, unbalanced at 1% THD+N

NOTE: 0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV ≈ 2 dBu

Audio input — PowerCage FOX Tx HDMI

Number/signal type	1 unbalanced stereo or 2 unbalanced mono
Connectors	(1) 3.5 mm mini stereo jack
Impedance	18k ohms unbalanced, DC coupled
Nominal level	+4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level	+8.9 dBV, unbalanced at 1% THD+N

NOTE: 0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV ≈ 2 dBu

Audio output — PowerCage FOX Rx VGA, PowerCage FOX Rx DVI Plus

Number/signal type	1 stereo, balanced/unbalanced *or* 2 mono, balanced/unbalanced
Connector	(1) 3.5 mm captive screw connector, 5 pole
Impedance	50 ohms unbalanced, 100 ohms balanced
Nominal level	+4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level (Hi-Z)	+7.6 dBu, unbalanced at 1% THD+N
Maximum level (600 ohms)	>+6.3 dBu, unbalanced at 1% THD+N
Audio delay	1.5 frames

Audio output — PowerCage FOX Rx AV

Number/signal type	1 stereo, balanced/unbalanced *or* 2 mono, balanced/unbalanced
Connector	(1) 3.5 mm captive screw connector, 5 pole
Impedance	50 ohms unbalanced, 100 ohms balanced
Nominal levels	+4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level (Hi-Z)	>+19 dBu, unbalanced at 1% THD+N
Maximum level (600 ohm)	>+15 dBm, unbalanced at 1% THD+N
Audio delay	1.5 frames

Audio output — PowerCage FOX Rx HDMI

Number/signal type	1 balanced/unbalanced stereo or 2 balanced/unbalanced mono
Connectors	(1) 3.5 mm captive screw connector, 5 pole
Impedance	50 ohms unbalanced
Nominal level	+4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level (Hi-Z)	>+11.0 dBu, balanced at 1% THD+N
Maximum level (600 ohm)	>+10.0 dBu, balanced at 1% THD+N
Audio delay	1.5 frames

Audio — PowerCage MTP T 15HD RSA, PowerCage MTP R 15HD RSA SEQ

Number/signal type	1 set of proprietary analog signals
Connector	1 female RJ-45
Gain	Unbalanced output: 0 dB; balanced output: +6 dB
Frequency response	20 Hz to 20 kHz, ±1 dB
THD + Noise	0.15% @ 1 kHz, 0.3% @ 20 kHz at nominal level
S/N	>70 dB at maximum output (unweighted)
Stereo channel separation	>60 dB @ 1 kHz
CMRR	>43 dB @ 20 Hz to 20 kHz

Audio input — PowerCage MTP T 15HD RSA

Number/signal type	1 stereo, unbalanced
Connector	(1) 3.5 mm captive screw connector, 5 pole
Impedance	>10k ohms, unbalanced
Nominal levels	+4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level	+18 dBu, (unbalanced) at 1% THD+N

NOTE: 0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV ≈ 2 dBu

Audio output — PowerCage MTP R 15HD RSA SEQ

Number/signal type	1 mono, balanced/unbalanced
Connector	(1) 3.5 mm captive screw connector, 5 pole
Impedance	50 ohms unbalanced, 100 ohms balanced
Gain error	±1 dB channel to channel
Nominal levels	+4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level	+18 dBu, unbalanced at 1% THD+N

Audio — PowerCage MTP T AV, PowerCage MTP R AV

Number/signal type	1 set of proprietary analog signals
Connector	1 female RJ-45
Gain	Unbalanced output: 0 dB; balanced output: +6 dB
Frequency response	20 Hz to 20 kHz, ±1 dB
THD + Noise	0.15% @ 1 kHz, 0.3% @ 20 kHz at nominal level
S/N	>70 dB at maximum output (unweighted)
Crosstalk	<-80 dB @ 1 kHz, fully loaded
Stereo channel separation	>60 dB @ 1 kHz
CMRR	>43 dB @ 20 Hz to 20 kHz

Audio input — PowerCage MTP T AV

Number/signal type	1 stereo, balanced/unbalanced
Connector	(1) 3.5 mm captive screw connector, 5 pole
Impedance	>10k ohms, unbalanced; >20k ohms, balanced; AC coupled
Nominal levels	+4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level	+18 dBu, (unbalanced) at 1% THD+N

NOTE: 0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV ≈ 2 dBu

Audio output — PowerCage MTP R AV

Number/signal type	2 mono, balanced/unbalanced
Connector	(1) 3.5 mm captive screw connector, 5 pole
Impedance	50 ohms unbalanced, 100 ohms balanced
Gain error	±1 dB channel to channel
Nominal levels	+4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level	+18 dBu, unbalanced at 1% THD+N

Control/remote

NOTE: PowerCage MTP AV Series boards do not have any RS-232 communication.
PowerCage MTP 15HD Series boards have only pass-through RS-232 communication.

Serial control ports

- Enclosure ..... 1 bidirectional RS-232, 2.5 mm mini stereo jack (front panel)
- PowerCage FOX boards
  - Control ..... 1 bidirectional RS-232, 3.5 mm captive screw connector, 5 pole (uses 3 poles; shared with the alarm port)
  - Pass-through ..... 1 RS-232, 3.5 mm captive screw connector, 5 pole (3 pins are used, "RS-232 Over Fiber")
- PowerCage MTP 15HD boards . External device; pass-through, uni- or bidirectional
  Input/output: 1 set of proprietary signals on a female RJ-45 jack
  Output/input: 1 RS-232 via 3 poles of a 3.5 mm captive screw connector (3 pole for transmitter, 5 pole for receiver)

Baud rate and protocol

- PowerCage FOX boards
  - Control ..... 9600 baud, 8 data bits, 1 stop bit, no parity
  - Pass-through ..... 9600 to 115,200 baud
- PowerCage MTP 15HD boards
  - Baud rates ..... Up to 38400 bps at up to 600' (182.9 m)
    (Higher data rates and distances are possible. Performance varies based on baud rate and cable length.)
  - Protocol ..... Data bits = 5 - 8
    Stop bits = 1 or 2
    Parity = odd, even, none
    Flow control = XON, XOFF, none
    Defaults: 8 data bits, 1 stop bit, no parity

NOTE: For PowerCage MTP boards, protocol is mirrored between the transmitter and the receiver.

Serial control pin configurations

- Captive screw connector
  - PowerCage FOX boards ..... 1 = Tx, 2 = Rx, 3 = GND
  - PowerCage MTP 15HD boards
    Transmitter: 1 = Tx, 2 = Rx, 3 = GND
    Receiver: 3 = GND, 4 = Tx, 5 = Rx
- Mini stereo jack ..... RS-232: tip = Tx, ring = Rx, sleeve = GND

Program control ..... For FOX boards only:
Extron control/configuration program for Windows®
Extron Simple Instruction Set (SIS™)

General

Recommended cable type ..... For PowerCage MTP boards: Extron Enhanced Skew-Free™ AV UTP cable or CAT 5/5e/6 (shielded or unshielded)

Power supply ..... Internal*
100-240 VAC, 50-60 Hz; 1 or 2* (positive-negative) hot-swappable power supplies
*A redundant power supply is optional.

Power consumption	
System	Enclosure without boards: 12.4 watts
Individual FOX boards	FOX Tx VGA: 5.68 watts FOX Rx VGA: 6.54 watts FOX Tx DVI: 5.67 watts FOX Rx DVI: 5.50 watts FOX 3G HD-SDI: 1.84 watts FOX Tx AV: 6.89 watts FOX Rx AV: 5.57 watts FOX DVI Plus Tx: 5.68 watts FOX DVI Plus Rx: 6.18 watts FOX Tx HDMI: 5.68 watts FOX Rx HDMI: 6.18 watts
Individual MTP boards	MTP T 15HD RSA: 4.30 watts MTP R 15HD RSA SEQ: 8.38 watts MTP T AV: 2.69 watts MTP R AV: 3.92 watts
Power input requirements for boards.	12 VDC, 1.0 A, supplied by the PowerCage enclosure
Temperature/humidity	Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, noncondensing Operating: +32 to +122 °F (0 to +50 °C) / 10% to 90%, noncondensing
Cooling	Enclosure: fans, front to back Boards: convection, within the PowerCage enclosure
Thermal dissipation	27.6 BTU/hr
Mounting — PowerCage enclosure	
Rack mount	Yes
Enclosure type	Metal
Enclosure dimensions	
PowerCage enclosure	5.25" H x 17.0" W x 12.25" D (3U high, full rack wide) 13.3 cm H x 43.2 cm W x 31.2 cm D (Depth excludes connectors on the optional boards. Width excludes rack ears.)
PowerCage FOX boards	Each fits a double slot opening in a PowerCage enclosure.
PowerCage MTP R 15HD RSA SEQ	Each fits a double slot opening in a PowerCage enclosure.
All other boards	Each fits a single slot opening in a PowerCage enclosure.
Product weight	
PowerCage enclosure	11.6 lbs (5.3 kg)
PowerCage FOX boards	1.1 lbs (0.5 kg)
PowerCage MTP R 15HD RSA SEQ	1.0 lbs (0.5 kg)
All other boards	0.8 lbs (0.4 kg)
Shipping weight	
PowerCage enclosure	13 lbs (6 kg)
Boards	2 lbs (1 kg) each
Vibration	ISTA 1A in carton (International Safe Transit Association)
Regulatory compliance	
Safety	CE, c-UL, UL Additionally for FOX boards: FDA Class 1
EMI/EMC	CE, C-tick, FCC Class A, ICES, VCCI
MTBF	30,000 hours
Warranty	3 years parts and labor

NOTE: All nominal levels are at ±10%.

NOTE: Specifications are subject to change without notice.

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Part Numbers

Included Parts

The following items are included with the PowerCage 1600 Modular Power Enclosure:

Included Parts	Replacement Part Number
PowerCage 1600 Enclosure (3U, 16-slot frame)	60-978-01
Rack mounting brackets	
Blank slot covers: 1 single slot, 7 dual slot, 1 power supply cover	
Self-adhesive rubber feet	
Extron software disk (which includes guides)	
PowerCage 1600 Enclosure Setup Guide	

Optional Accessories

The following items are sold separately from the enclosure:

PowerCage Power Supply and Boards		Part Number
PowerCage 1600 Power Supply Kit Redundant Power Supply Option		70-784-01
PowerCage FOX Tx VGA MM PowerCage FOX Rx VGA MM PowerCage FOX Tx VGA SM PowerCage FOX Rx VGA SM Fiber optic extender for VGA, audio, and RS-232	Multimode transmitter Multimode receiver Singlemode transmitter Singlemode receiver	70-699-11 70-699-21 70-699-12 70-699-22
PowerCage FOX Tx DVI MM PowerCage FOX Tx DVI SM Fiber optic extender for DVI, audio, and RS-232	Multimode transmitter Singlemode receiver	70-700-11 70-700-12
PowerCage FOX Tx DVI Plus MM PowerCage FOX Rx DVI Plus MM PowerCage FOX Tx DVI Plus SM PowerCage FOX Rx DVI Plus SM Fiber optic extender for DVI, audio, and RS-232	Multimode transmitter Multimode receiver Singlemode transmitter Singlemode receiver	70-873-11 70-873-21 70-873-12 70-873-22
PowerCage FOX Tx HDMI MM PowerCage FOX Rx HDMI MM PowerCage FOX Tx HDMI SM PowerCage FOX Rx HDMI SM Fiber optic extender for HDMI, audio, and RS-232	Multimode transmitter Multimode receiver Singlemode transmitter Singlemode receiver	70-889-11 70-889-21 70-889-12 70-889-22
PowerCage FOX 3G HD-SDI MM PowerCage FOX 3G HD-SDI SM Fiber optic extender for multi-rate SDI	Multimode transceiver Singlemode transceiver	70-701-01 70-701-02
PowerCage FOX Tx AV MM PowerCage FOX Rx AV MM PowerCage FOX Tx AV SM PowerCage FOX Rx AV SM Fiber optic extender for video, audio, and RS-232	Multimode transmitter Multimode receiver Singlemode transmitter Singlemode receiver	70-702-11 70-702-21 70-702-12 70-702-22
PowerCage FOX Tx HDMI MM PowerCage FOX Rx HDMI MM PowerCage FOX Tx HDMI SM PowerCage FOX Rx HDMI SM Fiber optic extender for HDMI, audio, and RS-232	Multimode transmitter Multimode receiver Singlemode transmitter Singlemode receiver	70-889-11 70-889-21 70-889-12 70-889-22

PowerCage Power Supply and Boards	Part Number
PowerCage MTP T 15HD RSA Twisted pair transmitter for VGA and audio or RS-232	70-817-01
PowerCage MTP R 15HD RSA SEQ Twisted pair receiver for VGA and audio or RS-232 with skew equalization	70-818-01
PowerCage MTP T AV Twisted pair transmitter for composite or S-video and audio	70-815-01
PowerCage MTP R AV Twisted pair receiver for composite or S-video and audio	70-816-01

Cables	Part Number
9-pin D female to 2.5 mm TRS configuration cable	70-335-01

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Extron Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America, and Central America:
Extron Electronics
1001 East Ball Road
Anaheim, CA 92805
U.S.A.

Japan:
Extron Electronics, Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

Europe and Africa:
Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

China:
Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

Asia:
Extron Asia
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363
Singapore

Middle East:
Extron Middle East
Dubai Airport Free Zone
F12, PO Box 293666
United Arab Emirates, Dubai

This limited warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions, or if modifications were made to the product that were not authorized by Extron.

NOTE: If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA: (714) 491-1500 **Europe**: +31.33.453.4040
Asia: +65.6383.4400 **Japan**: +81.3.3511.7655

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

Extron Headquarters		Extron Europe	Extron Asia	Extron Japan	Extron China	Extron Middle East	Extron Korea	Extron India
+1.800.633.9876 (Inside USA/Canada Only)		+800.3987.6673 (Inside Europe Only)	+800.7339.8766 (Inside Asia Only)	+81.3.3511.7655	+4000.398766 Inside China Only	+971.4.2991800	+82.2.3444.1571	1800.3070.3777 Inside India Only
Extron USA - West	Extron USA - East	+31.33.453.4040	+65.6383.4400	+81.3.3511.7656 FAX	+86.21.3760.1568	+971.4.2991880 FAX	+82.2.3444.1575 FAX	+91-80-3055.3777
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